requires a minimum of 110 tons per square inch, or a total striking pressure of at least 155 tons to strike a double eagle, according to E. V. Crane.[3] If Newman's cast steel dies could be hardened to withstand this pressure, why couldn't a cast steel collar?

Early in my reexamination of the Franklin Hoard material I photographed the edges of four USAOG twenty dollar coins, three of which originated with Paul Franklin. One photograph illustrates the reeding of USAOG-100, my silver strike from hub Group IX dies, and the reeding of USAOG-102, one of the two perfect prooflike pieces I retained from hub Group V dies. The second photograph illustrates the reeding of USAOG-114, the famous "Tobias" coin from hub Group VII dies, and the reeding of USAOG-116, a well circulated regular piece from hub Group III dies. The first three described were, of course, struck from collars having 170 edge reeds, the last from a collar having 162 edge reeds. In order to be in focus at the extreme focal length (distance between lens and film) at which these photos were taken, the edge of each of the two coins (in either picture) had to be on a perfect horizontal plane with its companion. Therefore, either pair of edge reed enlargements have been photographed at an identical degree of magnification. From careful examination of these four USAOG coin edges two important conclusions can be quickly reached. To begin with, the quality of the edge reeding shown does not

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3 pg. 244, "Plastic Working of Metals and Non-Metallic Materials in Presses," E. V. Crane, Ph. B., M.E. Third edition, New York, N. Y. and London, England, 1944.

necessarily suggest the precision tooling of a collar or collars by a modern "automatic gear hobbing or broaching machine." Secondly, it is quite obvious that two, possibly three, different collars were used to strike the three different Franklin Hoard USAOG twenty dollar coins enumerated. Are we also to believe that Newman's mythical forger made extra collars to add to his expensive collection of four different hubs, fifteen or more different working dies and four different alphabets, plus the multiplicity of other items he had to have to produce the Franklin Hoard material?

On pages 8 and 9 of the Inquiry, Newman discusses the USAOG twenty dollar coin owned by Herbert Tobias (his No. 6, my USAOG-114). It is believed that Tobias obtained this piece from Franklin directly, as it is not one of the five perfect prooflike specimens handled by the New Netherlands Coin Co. In describing the obverse of the Tobias coin Newman says that "under magnification...the right and bottom portions of the field...are completely filled with a large number of sweeping curved lines. These lines are very close together and are separated by identical distances. These lines are not arcs formed from the same center point but are a part of a perfectly uniform spiral or helix (sic) with the center point of the coin as a center." After describing the peculiar design on the Tobias piece, Newman goes on to explain how a lathe

equipped with an automatic cross feed device works, and then reasons that the described spiral design could not have been in the obverse die from which the coin was struck, but could only of have been on the planchet of the Tobias specimen before it was struck. He finalizes this theory with a statement that "The planchet therefore was produced by a lathe in a most abnormal manner." Newman's tortured reasoning concludes with the inference (page 9) that the Tobias coin must be false, as its planchet could only have been produced by a lathe equipped with an automatic cross feed device, this component not being available on lathes in America in 1853. On page 13, he makes his inference a statement of fact as he describes the hardships of his alleged forger: "He seems...to have tried cutting the planchets on a modern lathe with an automatic cross cut mechanism."

Shortly after first hearing about an "automatic cross feed" device for lathes at the Arbitration Panel meeting in Chicago, I found myself browsing through a booklet titled: "A Short History of Machine Tools."[4] Two illustrations and their captions quickly caught my eye: on page 114, illustration No. 50 was captioned "Joseph Whitworth's automatic cross feed for lathes, 1835;" opposite page 117, illustration No. 53 bore the

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[4] "A Short History of Machine Tools," L. T. C. Rolt, The M.I.T. Press, Massachusetts Institute of Technology, Cambridge, Mass., 1965.

caption - "Lathe by Joseph Whitworth with automatic cross feed, 1843." Fired by these promising leads towards demolishing the positive Newman statement "based upon certainty," I wrote the publishers of the Machine Tool booklet in an effort to contact the author. Surprisingly, this gentleman, a Mr. L. T. C. Rolt, turned out to be an Englishman who had never visited the United States. He explained in a letter to me that he relied upon American printed sources for his U. S. references, and he referred me directly to the author of many of these, Robert S. Woodbury, Professor, History of Technology, Department of Humanities, Massachusetts Institute of Technology. In advising me to contact Professor Woodbury, Mr. Rolt told me he was considered a great authority on American Machine Tool history. I quickly verified this myself by visiting the nearest library of consequence, where I found that Woodbury had written the "History of the Lathe to 1850," for the Society for the History of Technology, in 1961, and was also responsible for many other references pertaining to machine tool history.[5] I wrote to Professor Woodbury, and we arranged an appointment to meet in New York City. When we got together, I explained the situation to him in considerable detail and briefed him as much as I could on the activities of the USAOG. It was a pleasure to talk to the Professor, as he seemed well versed in the technical aspects

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5 "History of the Gear-cutting Machine," R. S. Woodbury, Cambridge, Mass., 1958; "History of the Grinding Machine," R. S. Woodbury, Cambridge, Mass., 1959; "History of the Milling Machine," R. S. Woodbury, Cambridge, Mass., 1960.

of coin production. When I showed him the pertinent pages in Newman's Inquiry pertaining to the use of a lathe he appeared greatly interested. Accordingly, I gave him a copy of the Newman Inquiry and a copy of the latest Whitman "Guide Book." Upon his return to M.I.T. Professor Woodbury applied himself to the contents of the Newman Inquiry and he and I entered upon a rather extensive correspondence.

Professor Woodbury wrote me several letters, two of which pertain directly to the Newman allegations concerning the Tobias coin and the use of a lathe in its production.[6] These Woodbury letters are highly informative and should be carefully read in their entirety, but I believe a summary of their contents and quotations from them will suffice to completely refute Newman's contentions and conclusions. Professor Woodbury's findings, observations, and conclusions are as follows:

1. He considered the possibility that the fine curved lines "appearing on the eagle face of (Newman) Coin #6 in a sector of approximately 30^{o} to 200^{o} from the vertical axis of the coin" could be either concentric or spiral. After examining several possibilities towards their being concentric lines, he concluded that unless

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[6] Letters Prof. Robert S. Woodbury to John J. Ford, Jr., December 2nd and 8th, 1966 (Appendix items, Nos.16 and 17).

"We have positive proof that these marks are concentric circles, we can reject that possibility."

2. In assuming that the curved lines formed part of a spiral, Professor Woodbury examined the possibilities that they "are portions of a spiral cut in either the gold planchet from which the coin was made or in the die blank by which it was stamped." Two paragraphs of his letter to me of December 8th indicate total disagreement with the Newman conclusion that the pertinent lines were made on the planchet of the Tobias USAOG piece (Newman No. 6):

> "The question then remains were they made on the planchet or on the die blank? To find these marks on the planchet used to make Coin #6 we would be forced to assume that the gold was worked into a cylinder of diameter at least as great as that of the planchet, a disc cut off and then faced with a lathe. In view of the practice since Da Vinci's day of producing the planchet by punching from a bar of gold of the requisite thickness and the extreme unlikelihood of anyone hammering out, drawing, or rolling a cylinder of gold of these dimensions, we can safely reject this possibility.

The other, and by far the most certain explanation, -- one which fits all the facts to be found on Coin #6, the facts of tool technology, the facts of tool history, and the logic of unspeculative common sense is that these marks were made in facing-off the end of a steel cylinder for a die blank. This would be done on a quite ordinary and common lathe using hand control of the mechanical cross feed. This cylindrical piece, contrary to usual practice, was then smoothed and perhaps polished on only part of its face, before the die was impressed. The remaining tool marks would then be reproduced exactly as found on Coin #6."

3. Professor Woodbury, because of his primary interest in machine tool history and technology, took exception to the Newman assertion relative to the uniformity of the curved lines on the Tobias coin. In his letter to me of December 2nd, he wrote:

"Mr. Newman goes on 'This design is so perfect that it had to be produced on a lathe and could not be cut by a skilled hand in 1853 or now.' Here he has gone beyond his competence. Such a

design CAN be produced by even a reasonably skilled lathe operator now, and was being produced as early as 800 B. C. (See my 'History of the Lathe to 1850') Any competent lathe operator since Maudslay's time can back off his cutting tool by uniform hand rotation of his cross feed control to produce this order of accuracy. Newman's statement here is not only 'speculation as to fact'; it is not 'based on certainty.' In fact it is based on ignorance of common machine tool practice now and in the past."

4. The Newman argument in attempting to show that a lathe with a automatic cross feed was required to produce such a pattern as that found on the Tobias coin concluded (on page 9) in typical Newman climactic style with the positive statement that "In 1853 the automatic cross cut device was not available on lathes in America." Professor Woodbury, probably the foremost authority in the United States on what machine tools were in use a century ago, also took exception to this Newman assertion. In the same letter of December 2nd, he said:

"Here we have a categorical statement presented as based upon certainty, but in fact not at all based upon historical evidence. ...There is clear evidence

(British Patent #6850) for automatic cross feed as early as 1835 and this feature was clearly embodied in an illustration of lathes offered for sale by Whitworth in 1843. Whitworth's firm was exporting these lathes all over the world. It is impossible to believe that this 'device was not available on lathes in America' in 1853. American manufacturers at this time were so far ahead in their technical methods that a British Commission (of which Whitworth was a member) came over in 1855 to study them. These methods were imported into England (see Nathan Rosenberg 'Great Britain and the American System of Manufacturing,' Edinburgh U.K. 1966). Surely either Robbins & Lawrence in Springfield, Vt. or the Colt Armory, Hartford, Conn., or Brown & Sharpe, Providence, R.I. had such a tool. At the New York Exhibition of 1853 Whitworth lathes were exhibited. There is every reason to believe that such a lathe was available in the United States in 1853."

Professor Woodbury, on the second page of his letter to me of December 8, 1966, describes exactly how the curved line marks on the obverse of the Tobias coin were made. He discounts the need for a lathe with an automatic cross feed device (even

though it was, as we have seen, undoubtedly available), and suggests (as I have said) that an ordinary lathe with mechanical cross feed was used. Since his exact description of the only two ways that the lines on the Tobias coin could have been put there completely explains their presence, I again quote from the Woodbury letter of December 8th:

> "These lines on Coin #6 would be recognized as either those left by a cutting-off tool or those left by facing the end of the bar of stock to get a surface flat and perpendicular to the axis. When a bar of stock, presumably cylindrical, has a disc cut off from one end of it (the bar being held in a conventional chuck and not between centers), it is done by a tool with a narrow cutting edge parallel to the axis about which the bar of stock is rotating. The corners of this tool leave just such fine marks as are seen on Coin #6, and would be spiral. The same marks would be left by a facing-off tool. Since the cut in the latter procedure is light and usually made from the center to the outer circumference, it would be easier to do the work with more accurate spacing of the spiral lines in this manner. So of the two possibilities I believe

that these marks were more probably made with a facing-off tool on a lathe with mechanical, but hand controlled cross feed."

We have seen that Newman is consistent. He sticks to his absolutely fallacious basic premise that only one working die is made and used when a working hub is sent to a branch mint (or its equivalent). He has convinced himself that since the lines found on the obverse of the Tobias piece were not to be found upon the obverses of the other Franklin Hoard coins available to him, that they had to be on the planchet of the Tobias coin. Why didn't it occur to Newman that the obverse die used for the Tobias coin could have been discarded, and another quickly made? Or why didn't he think about how easy it would have been to just simply polish away the light curved lines on that obverse die? Professor Woodbury mentions this last probability, and discusses why the curved lines were not removed entirely from the die blank before hubbing, in the last paragraph of his letter to me of December 8, 1966.

Newman, in discussing the marks on the obverse of the Tobias coin, stated: "...I am unaware of such a marking on any other coin of any type." He might be, but I am not. Evidence of die blank spirals can be found upon several large cent obverses of 1802 and 1803, and on the obverse of the 1854 ("1851") experimental Liberty Seated cents in german-silver, etc.[7] (although for different reasons). Spirals similar to those on the Tobias coin

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[7]See Adams-Woodin Nos. 146, 148, 149; Judd Nos. 156-159 inclusive.

are also demonstrable on an 1862 Half Anna of India, a rarity struck in gold from the Brand collection.[8] They are found in the obverse bust of Queen Victoria, commencing at a point at the top of the braid below the ear. They are not to be seen in the field, since the coin is a brilliant proof, the spiral marks there having been removed when the face of the obverse die was polished. Professor Woodbury examined this piece and enlarged photographs of its obverse (USAOG-118, reference), and wrote me a letter in which he expressed his opinion concerning it:[9] "...it is my firm opinion that these lines are the result of essentially the same methods in preparing the dies used for the Coin #6 $20 USAOG. The reasons for doing this kind of work may, of course, have been quite different in India from those in San Francisco, but the techniques and the results are the same. ...This 1862 Victoria Half Anna then definitely shows that the lines on Coin #6 $20 USAOG are by no means unique, and that Newman's statement on page 8 of his 'Inquiry' that he is 'unaware of such a marking on any other coin of any type,' carries no weight at all in the question of the authenticity of Coin #6 $20 USAOG."

In order to double check my feeling that the lines on the obverse of the Tobias coin were on the die blank before

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[8] Virgil Brand collection, inventory No. 124475. Purchased by Spink's as lot 159, first day's sale, coll. of John G. Murdoch, July 21, 1903, Sotheby, Wilkinson & Hodge, London.

[9] Letter, Prof. Robert S. Woodbury to John J. Ford, Jr., January 30, 1967 (Appendix Item No. 18).

hubbing, I sent two of my enlarged photographs to the Royal Mint in London (obverse, USAOG-114; USAOG-118). In time, I received a reply confirming that the Chief Engraver agreed with my contention.[10]

On page 9 of the Inquiry Newman gets around to talking about the tests that George Fuld had made at the Goodyear Tire plant: "Only coins #2, 3, 4, 5, 6 and 7 were tested by X-ray diffraction and the photographic prints have been interpreted to show that the planchets for coins #5 and 7 were cast rather than drawn while the others were not cast. The photographic results show a much greater dispersion of the rays passing through #5 and 7." Newman has here made an erroneous conclusion predicated upon his lack of understanding of the practical usage of X-ray diffraction in numismatics.

Both X-ray diffractometry and X-ray diffraction are generally used in numismatics to ascertain the amount of surface stress which the metal of a coin has undergone as a result of striking. The amount of pressure exerted upon a planchet while it is being stamped determines its surface stress characteristics. The analysis of these surface stress characteristics makes X-ray diffractometry or X-ray diffraction a valuable method to differentiate a cast coin (with a near perfect surface) from a struck piece. The cast coin possesses no appreciable stress characteristic as a result of its molten metal cooling, whereas the struck

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[10] Letter, G. P. Dyer, Royal Mint, London, to John J. Ford, Jr., February 16, 1967 (Appendix item No. 19).

piece, in comparison, possesses substantial stress deformation due to the huge striking pressures and consequent work hardening of the surface metal. X-ray diffraction involves the same basic principles as X-ray diffractometry, but with X-ray diffraction a special camera is used instead of a detector, and the diffracted rays are recorded on film instead of being read on a scale.

Believing that the coins from Paul Franklin were in reality experimental alloy strikings, I had a suspicion that Fuld, and then Newman, misinterpreted the differences shown by the Fuld X-ray diffraction tests on two Franklin Hoard coins and a group of three regular USAOG twenty dollar gold pieces used for comparative or control purposes. With this thought in mind, I gave a copy of the Newman report to a friend of mine, Theodore L. Craige, and asked him to look it over. Mr. Craige has been a professional, practicing engineer for thirty years, and is currently Director of Engineering of a division of "TRW" (Thompson, Ramo, Wooldridge, Inc.). He and I have often discussed and sometimes jointly worked upon problems concerning numismatic metallurgy. Many of these problems involved questioned items, or were matters related to coin authentication. I have learned much from Craige, generally in the unexplored areas of metal deterioration such as galvanic reaction, and have high regard both for his professional ability and numismatic knowledge. I could think of no one better equipped to tell me if the interpretations given the Fuld tests could have been incorrect.

To assist Craige at arriving at a correct evaluation of

the announced results from the Fuld X-ray diffraction photographic prints, I made all of my Franklin Hoard and other USAOG coins, pictures and papers, available to him. He studied the material leisurely for some time, and then wrote me his conclusion.[11] His general observations concerning the Newman Inquiry as a whole were hardly complimentary, but it is his specific analysis of what Newman had to say concerning the Fuld tests that I would like to quote here: "... I am concerned lest X-ray diffraction by the reflection method be looked askance at in the future, because of this erroneous report, and, therefore, would like to absolve it by commenting on page 9, paragraph 2, of said document." The Craige comment concerning the Franklin Hoard USAOG twenty dollar gold coins is as follows:

> "All planchets are derived from casting the gold alloy into slabs called ingots, the size and thickness of which is determined by the quantity of gold needed. Since this was experimental work and not production work, probably small batches of each gold alloy were carefully prepared and then melted and cast into small thin ingots. Pure gold is soft; it is hardened by alloying and 'cold work' (such as rolling or striking). Copper is a hardener added to gold

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[11] Letter, Theodore L. Craige to John J. Ford, Jr., July 15, 1967 (Appendix item No. 20).

coins to make them more durable in circulation. The gold alloys used here contained various copper content, including none, and, therefore, when cold rolled to thickness 'worked' differently. Some ingots required much more cold rolling to final thickness than others; thus the grain size of the former was smaller than the latter by virtue of the metal being more compacted by additional working. Accordingly, we should expect to find planchets with varying degrees of grain size--fine to coarse.

All planchets prior to striking have to be heat annealed to make them sufficiently soft to minimize coining pressures and die damage and to prevent the struck coins from cracking. This striking of the planchets by obverse and reverse dies, together with the expansion of the flan edge into the reeded collar, work hardens the coin, especially in surface and near surface areas. Where coin thickness (as in this case) is appreciable, compared to the imparted 'Design Relief,' most of the metal deformation and flow is in these aforementioned areas. The section deep within the coin is not appreciably affected by normal coining pressures, and is, for the most part, of grain structure dependent on its prior history, i. e., cast ingot to final reduced

thickness chronology. Since different alloys required different degrees of rolling and, hence, possessed varying grain size, the struck specimens also possessed varying internal grain size particles.

X-ray diffraction by the reflection method was used to draw an erroneous conclusion. This method, under favorable circumstances, can be used to measure the stress deformation imparted to a struck coin at its surface and near surface areas.[11a] However, when the grain structure of the specimen is relatively large, or coarse, the X-ray diffraction rings show a much greater dispersion, making the stress determination most impossible![11b] This is why line 2 of paragraph 2, page 9, says: 'and the photographic prints have been interpreted to show that the planchets for coins numbers 5 and 7 were cast, etc.' Therefore, the X-ray diffraction method is inapplicable for those experimental coins with coarser grain structures, except to prove that they had comparatively coarser grains than other specimens by virtue of their prior history."

11a "In back-reflection measurements, particularly with the strongly absorbed long-wavelength X-rays commonly used, the resulting information is largely confined to the surface properties of the sample." (From) "X-Ray Studies of Materials, A. Guinier and D. L. Dexter, New York & London, 1963" (Appendix item No. 21).

11b ibid. Page 101: "...if the sample were composed of rather large grains so that the lines are punctuated, it would be impossible to determine the position of maximum intensity of the ring with the required precision" (Appendix item No. 22).

Craige concluded his letter with the thought that "...X-ray diffraction is an excellent tool when properly used. To do so, its limitations must be carefully considered." This remark is quite relevant, and penetrates to the heart of the current situation. Very few collectors or dealers have had actual experience with X-ray diffraction or any of the other scientific tests available to numismatics. Others have heard about them, but have only a vague idea of just what each test can or cannot do, or how specific tests can be applied to particular situations. For the unconversant always in seek of a quick panacea for the illnesses plaguing our hobby, and the sophomoric "Pseudo Expert" who cleverly drops test terms in his conversation, a little knowledge can indeed be a dangerous thing. Scientific tests are but tools, and as such are only as good as those interpreting them. In turn, those interpretations have to be evaluated by those with extensive numismatic knowledge and experience. Unfortunately, there is no such thing as all-inclusive numismatic knowledge, and thus such evaluations must be made by someone who has long specialized in and has intimate cognizance of the narrow field being studied.

In closing this examination of the substance and peripheral contentions of the Newman Inquiry, I am reminded of a sentence in the final paragraph of one of Professor Woodbury's letters to me: "In short, Newman is asking us to believe an elaborate series of arguments, each of varying degrees of doubt or impossibility, but taken as a whole absolutely preposterous."

THE NEWMAN ARGUMENT - HOW THE FRANKLIN HOARD COINS WERE MADE

The peripheral contentions of the Newman report seemingly serve as adjuncts to the heart of his Inquiry - how the controversial coins were manufactured. As earlier mentioned, Newman examined six Franklin Hoard pieces. Three of these, his Nos. 6, 14, 15, he contends were struck by the forger from a cast die made from a cast ceramic hub (mould) fabricated from a wax (or similar) impression taken from a genuine (Group X) coin. This piece would show (among other characteristics) the reverse chip at T of UNITED and the tablet break at right from the first A and S in ASSAY to L of GOLD to the second C of FRANCISCO and below. It would also have a reverse tablet frame line dent centered under the lower vertical serif of the F in CALIFORNIA. Following the striking of his Nos. 6, 14, 15, Newman tells us that the forger attempted to improve the quality of his working dies by removing the chip at the T and almost all of what can be called the "circumferential" break at the right. Following this, we are told that (Newman) Nos. 5, 7, 16, were struck. These are the steps that Newman believes the maker of the Franklin Hoard coins used:

1. A wax, latex or plastic mould or negative was made from the coin, presumably by impressing it into a thick disk of the receptive substance. Obverse and reverse impressions would be needed and made separately.

2. These wax, latex or plastic negative impressions were independently repeatedly dipped into a ceramic slurry, withdrawn for drying between dippings, and the resulting thick layer of ceramic material baked to harden it, and, incidentally, to melt, burn off or vaporize the negative mould (traditional "lost-wax" method). This would leave a ceramic hub or positive for both obverse and reverse, which would be in relief like the original coin, and supposedly hard enough for the next step. Miraculously, we are led to believe that there was no shrinkage and no size discrepancy from thickness of the separating medium if any.

3. The ceramic hubs were used as templates for centrifugally casting working dies of molten steel (or some other hard metal), which cooled and were afterward hardened. There was, even more miraculously, no evidence of die granularity, porosity or shrinkage.

4. The dies were polished and new coins (of the Group VII type) were struck. Undoubtedly, these were on traditional cold-rolled blanks (which the exception of Newman No. 6 already discussed).

5. After manufacture of the dies and the Group VII coins, the reverse die was stamped into a die blank to raise a new hub, presumably of steel. No mention is made of the type of steel

used for this hub or of the striking pressure required to raise it, or of the metallurgical techniques involved in creating it.

6. After proper preparation, the Group VII hub was retooled by removal of the chip at the T and most of the tablet break at right.

7. A second working die was sunk from the altered hub, polished, and in the process of polishing suffered a nick on the upper right side of the N in UNITED.

8. Using the new reverse die, additional coins were struck (of the Group V type) lacking the chip at T of UNITED and most of the tablet break at right. Two of these are alleged to have been struck upon cast blanks (Newman Nos. 5, 7).

I have been told that the maker manufacturing contentions in the Newman Inquiry are more than a little confusing in their presentation. As enumerated above they are far from complex, and in reality represent a simple, pat solution to the forgery charges made by the Study Group (if one overlooks the numerous technical faults and failures inherent to the processes given). However, in spite of the intrinsically simple nature of the basic Inquiry manufacturing allegations, it is imperative that they (and their ramifications) be clearly understood before an attempt can be

made to follow my comments and explanation of this main phase of the Newman argument. With that point emphasized, let us examine more carefully some of the die and striking characteristics mentioned in the Newman report, page by page. (All future references are to pages of the Newman report).

On page 6: a "rice shaped raised lump under the right arm of the T of UNITED" is described as having "probably occurred during the abrupt temperature drop in hardening the steel die by immersion in liquid when heated." The suggestion is thus made that this chip is to be exclusively found on a working die. This is not the case; it is not just on a working die or dies. It is found on coins from the Franklin Hoard source and on coins not traced thereto and on isolated impressions of the tablet alone on bars. The listing of USAOG coins that is available establishes this in detail. A feature found in common on impressions from demonstrably different working dies cannot have been a result of accident to one of them but rather must have come from a much earlier stage, and as I have already said, this defect was in the original tablet puncheon negative (or matrix) used in making at least four and possibly five working hubs. This anticipates part of the argument given in a subsequent part of this refutation.

Also on page 6: Newman mentions what he describes as

a diagonal die scratch in the obverse field just right of the second A in AMERICA. Later in his report (page 13) he claims that this scratch was accidentally made by the maker of the Franklin Hoard twenty dollar coins and is thus distinctive to them. He calls it a "tell-tale" mark of the allegedly forged obverse die. If this is a scratch on a working die, it would not be found on any impressions from other dies. Careful examination of the non-Franklin Hoard Proof, the Seavey, Ulex, Proskey, Newcomer, Raymond, E. H. R. Green, Bell, Farouk, Kosoff coin, Newman number 12 (USAOG-123), reveals a faint, mostly effaced, mark identical in direction and extent. With the diagonal die scratch on this coin, we can only conclude that the scratch was in the hub, therefore in relief, therefore originally in the matrix from which the hub was raised. As earlier explained, this particular Proof does not have the physical characteristics of normal USAOG twenties; it is in fact in some ways even more of a deviant than the Franklin Hoard proof surface coins. Humbert's dies were never so drastically lapped or worked on as were those used to strike this piece.

While Newman could not see evidence of the obverse diagonal die scratch just right of the last A in AMERICA on the Kosoff Proof (his No. 12), he also did not notice its absence on two lead trials that I had obtained from Paul

Franklin, and which I sent him for examination, although he calls it a "tell-tale" mark and claims that it appears on the obverse of all Franklin Hoard pieces. These lead trials show two slightly differing states of an unpublished obverse intended for a fifty dollar piece. They have a large 50, the 0 not double-punched; (Newman Nos. 24, 25; my Nos. TGT/P-110, 115). The same diagonal field scratch just right of the second A also does not appear on three USAOG gold fifty dollar pieces, all of which have the 0 (in the denomination) double-punched. One of these is on a very broad planchet with a reeded edge; it has a small tight target reverse and no reverse legend, and is presently in the Lilly collection. The other two are piedforts; (see TG-121, 125). All three are, of course, also Franklin Hoard coins, and together with the two lead trials mentioned, dispel the Newman "tell-tale" mark contention.

On page 7: Newman makes much of a dent across the upper part of the I in UNITED on the obverse of the Franklin Hoard prooflike coins, stating "the dent is not found on other coins." Newman has here committed a major blunder, affecting his own line of reasoning and invalidating his conclusion. He assumes that this obverse dent was on the unknown prototype piece used by the maker of the Franklin Hoard coins with his die casting process. It is my contention that the dent across the upper part of the I in UNITED was on a working hub from

which several working dies were made. Instances of dents to hubs are known on United States coins.[1]

All the evidence required to show that the dent on I of UNITED was in a working hub is to locate coins from demonstrably different working dies sharing the dent on I. Newman says none exist. He has erred here and the subjoined listing shows several such coins, most significantly including two that have no connection with Paul Franklin. Both of these coins are from hub Group X, the latest matrix state known with additional circumferential breaks at left as well as evidence of the

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1 All half cents from 1840 through 1857 are from working dies (differing in dates and other details imparted by hand) sunk from a single obverse and a single reverse hub. Before the single obverse die was made for 1841 the obverse hub received a wedge shaped dent on the hair below the ear. All half cent obverses from 1841 through 1857 show this identical dent, though that for 1854 shows it corrected with fine hair, this having been added to the working die in that area. Before the small berry regular reverse half cent die was made for 1849 the hub received two small cuts on the upper wreath above HALF, and these cuts show on all subsequent reverses. The half dimes of 1840 (with drapery) through 1858 inclusive are all from working dies made from a single obverse hub. Chips out of the matrix between the stars resulted in raised marks on the hub; some of these were partly effaced on various working dies and show smaller or more faintly on the coins struck therefrom. Dr. Valentine's monograph on half dimes (A.N.S., NN&M #48, 1931) points out that in early 1857 the hub, having become badly worn (after manufacturing several hundred working dies, according to Walter Breen's discovery of die accounts for the period in the National Archives) was retouched. The working dies made from the hub after retouching differ in hand finishing details as usual, but the coins struck from all such dies now show a dent on the inside point of the 3rd star. As this dent is incuse on the coins, it must have been raised on the working dies, and the cause is obvious - it was incused on the hub, representing an injury thereto.

reverse frame line dent below F. One is USAOG-107 (Group X-1), photos from Smithsonian negatives 102a, 102b. It was obtained by the National Museum prior to 1957 as a regular USAOG twenty dollars. The other piece that I can cite is USAOG-126 (Group X-2), a regular USAOG twenty dollars selected from a large group of coins from Stack's stock. The obverse dent on the I of UNITED is also found on the two fifty dollar round obverses and on the two hundred dollar bar (from the Franklin Hoard, which see): (1) that showing 50 D. with the zero double-punched; (2) that with normal zero; (3) that with no denomination but blank space and D. (TG-114, lead TGT/P-110 or Newman No. 24, TG-113: photographs of these pieces are displayed as evidence.)

The appearance of one and the same dent on a coin long in the Smithsonian Institution, on a piece picked at random from a dealer's stock, and on four demonstrably different obverses of Franklin Hoard Coins, is good evidence that they were from working dies having one and the same hub as prototype. A hub is in relief like a coin. A depressed dent could have been inflicted to a hub, in which case the working dies sunk from the hub would show it in relief, and the coins struck from the working dies in turn would again show it as depressed. Variation in the depth of the dent (and thus in its appearance) would reflect either different force used in sinking the working dies

or in striking the coins, or else in some instances retooling of dies to minimize such injuries.

Top of page 13: Newman states that "the nicks on the original coin were transferred to the false die and were not noticed but were too difficult to remove if they had been." As we have just said, the nick or the dent on the I of UNITED is depressed on the coin; therefore, it would have to be raised in relief on the die. If anything would be easy to remove from a die, it would be such a nick or dent. Clearly, Newman is in error.

Last ditch adherents to the Newman argument might ignore the contention that the dent at I of UNITED might and can vary in appearance. To quickly prove my point, I would like to refer them to both USAOG-103 and 104, upon each of which the dent at I of UNITED is hardly discernible. These, of course, are Franklin Hoard coins, and, interestingly enough, are from entirely different reverse hubs (Groups IX and V).

Page 7: The remainder of Newman's argument is utter chaos. He argues from what I have called the "circumferential" break (on the right side of the reverse tablet) that only a single reverse working die was involved. By his theory, two different working dies cannot crack identically, with which there can be no disagreement. By his theory, a raised crack has to be from a crack suffered by a working die; therefore

if a coin from a demonstrably different working die shows the identical crack in any state, it must be an impression from a copy die using one of those coins as a prototype. By his theory, then, all normal USAOG twenty dollar coins must have come from different states of one and the same working die. By his theory, the absence of the chip at the T or the tablet break at right on Franklin Hoard coins of Group V, and presence of both the chip and crack on the Franklin Hoard coins of what I call Groups VII, VIII and IX, while the dent below F in frame line occurs on both classes, represents an impossible combination pointing to the manufacture of copy dies, viz. counterfeiting. The necessary and sufficient solution to this "impossible combination" problem is something not considered by Newman. The circumferential crack at right was not from an injury to a single working die, but rather progressive states of breakage of a matrix from which at least five working hubs had been raised. Dies were sunk from four of these hubs and used to strike coins. Two of the hubs show no trace of the break at right; the other two do. The circumferential break is found fully formed on the numerous coins examined or it is not there at all. No progressive partial stages are known. Coins showing progressive deterioration of a single working die can normally be arranged to show numerous intermediate states of the breakage. There are regular USAOG twenty dollar

coins representing many obviously different working dies from hub Group II, III, IV (without break at right) and hub Group X (break at right, additional breaks at both left and right). The differences in these working dies from these hubs (as detailed in the subjoined listing) are identifiable as from hand finishing, of much the same kind as the differences between any single cent reverse and other cent reverse of the 1844-57 period, or from damage to the working dies from use.

Total refutation of the specifics of Newman's argument is not difficult. Presence of the identical reverse tablet frame dents (below F of CALIFORNIA, centered above E of UNITED, an oblique one above the left top serif of Y in ASSAY, and others) both on Franklin Hoard and non-Franklin source coins points to a common origin in an original hub or even an original tablet puncheon (raised or positive). This is in itself strong evidence of genuineness. Whoever made the dies for the Franklin Hoard coins had access to original equipment and did not need any such crude procedure as that of casting dies.

I have already said that the reverse tablet break at right was in the matrix, showing as raised on the working hubs, therefore as incused lines in the working dies sunk from these hubs, therefore as raised breaks on the coins struck from them.

The raised spur projecting angularly downward and to the right from the right end of the right base of the first A in ASSAY has nothing to do with the tablet die break at right but occurs on both Franklin Hoard (Group VII, VIII, IX) and non-Franklin source (Group X) coins with the break, and on Franklin Hoard (Group V, VI) items without the break. The lump atop the first A in ASSAY is a chip (or more likely a heavy rust pit) transferred by one working hub (Group VII, VIII, IX), and is different in direction from the crack from this A to the upper frame line. The chip between the first S of ASSAY and L below is also not part of the circumferential tablet break at right. It is found on Franklin Hoard (Group VII, VIII, IX) and non-Franklin origin (Group X) coins. It is also found upon the tablets impressed into assay bars, Proofing pieces, and other USAOG items. These tablets were cut down from regular Group VI working dies. The circumferential break in the original matrix happened to pass through the lump between S and L even as it had grazed the spur from foot of first A of ASSAY.

Reference has been made to hub Group categories and the statement made that the circumferential crack on the reverse tablet at right appears on <u>coins</u> from two of these groups only as a discontinuous element of a working hub. This is true, but reverse hub "C" (found only on cut-down Group VI dies, i.e. in

tablet form only) does show a minute rust spot high in the field between the 1 8 (of date), which, under a binocular microscope, shows the faintest beginnings or traces of a break commencing upwards towards the C in CALIFORNIA. The basic reverse characteristics of these hub Group categories or classes (from known impressions in gold only) are as follows: (order given is that of probable hub use, not that of hub manufacture)

Hub Group	Chip at "T"	Break at right	Frame spur A-period	Denticle break 3:30 reverse	Chip r. edge 1. upright "N"	High N chip r. edge r. upright	Spur r.foot first A	Spur out top firstA	Chip be- tween S&L	New breaks 1. &r.
II										
III	Yes	No	Yes	No	No	No	No	No	No	No
IV										

Reverse hub "A". Probably 2 working dies, possibly more of II; only 1 found of III; many of IV. A Group II coin, USAOG-105 (photos from Smithsonian negatives 101a, 101b, Mint coll. No. 1625) shows tablet frame line dent below F, as do some working dies of Group IV but on most hand finishing has obliterated it. Non-Franklin origin only.

V	No	No	Lump only	No	No	Yes	Yes	No	No	No

Reverse hub "B". Possibly 2 or 3 working dies (coins TG-121 $50. Eagle; TG-126 $21.06 and TG-117 $44.77, Target, F-3 and F-1 obverses, appear to have different reverses on the photographs available), but faint cracks at 2:00, 5:30, 6:30 o'clock radially, engine turning to border, on all seen (matrix cracks?). Tablet frame line dent below F varies in shape,

depth (and thus appearance). Die (or dies) lapped, particularly at right side of tablet, which presumably gave Newman his erroneous idea that he was looking at an altered copy idea. Franklin Hoard only; prooflike.

VI	Yes	No	Sometimes visible	--	No	No	Yes*	No	Yes	No

Reverse hub "C". At least 5 cut-down working dies (some showing part of tablet frame line or border). *The spur from right foot of A is quite minute on this Group, and on one or more of the working dies appears to have been removed from the hub. On one Proofing piece (USAOG-P) the tablet frame line is generally intact, and the dent below F in CALIFORNIA is very prominent. Franklin Hoard only; mostly not prooflike.

VII

VIII	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	No

IX

Reverse hub "D". Possibly 2 or 3 working dies known. Confirmation of this is a subject for future investigation. Wide range of states and strikings indicating prolonged use of the working dies over a considerable period of time. (Lead trial pieces exist of Group VII with break at right seemingly removed from the hub; one has the spur from right foot of the first A in ASSAY also lacking.) Coins from VII prooflike, less so than V; coins from VIII more or less double-struck, not prooflike; coins from IX represent latest die state known, not as prooflike as previous coins. Franklin Hoard only.

X	Yes	Yes	Yes	Yes	No	No	Yes	No	Yes	Yes

Reverse hub "E". Additional hub circumferential and other breaks at left and right. Detailed analysis of six Group X coins (exhibit drawings C-1, C-2, C-3) suggest that a sixth hub might have been used and certainly that many working dies exist. Non-Franklin origin only.

We have said that the obverse dent on I of UNITED and the reverse dent on the frame line below F occur on both Franklin Hoard coins and those of non-Franklin origin. Both are found on hub Group X coins (X-1, USAOG-107, X-2, USAOG-126).

Page 14: Newman states: "Somewhere there is a beautiful genuine $20 U.S. Assay piece 900 fine which has the obverse dents and the reverse dents identical to those found on the coins from the Humbert Associate Source. It has the extended die break on the reverse. It has the lump under the T of UNITED. It is the piece from which the molds and dies were made to strike the Humbert Associate Source coins." Clearly, Newman thought that a top quality Group VII coin was used as the prototype. No such coin from a non-Franklin source exists. If a prototype was used to make cast dies, it could only have been a Group X coin. Are we to believe that the highly complicated six step transfer process (including the raising of a hub to remove break evidence) that Newman says was used to make corrected copy dies was performed twice? (A Group X coin to make Group VII, VIII, IX coins, a Group VII die to make Group V coins!) If so, for what possible conceivable purpose? How were the hub Group VI tablet impressions made? Was more than one Group VII working die made? Where did all the rust defects come from on the Group IX coins? If a Group VII die was used to raise a new hub and the chip at the T and most of the tablet break at the right removed (as Newman

claims), how did the maker perform the incredibly difficult (if not impossible) task of removing all traces of the complex reverse denticle break at 3:30 o'clock without leaving the slightest evidence of his handiwork on Group V coins? The small raised horizontal projection or spur from the upper right edge of the right upright of N in UNITED is not found upon hub Group X coins. Neither is the similar projection or spur on the right edge of the left upright of the same N. Yet the latter appears on hub Group VII coins, disappears on the hub Group V coins and is replaced by the Newman touted high chip, projection or spur on the right upright of N! Neither exist, one appears, disappears, another appears...but no mention is made of such phenomena. Admitted lack of knowledge of the hubbing process and the confusion of different dies can be the basis of almost any conclusion one could imagine, but it is not a sound basis for truth.

Page 10: Contentions already presented relating to the raising of five or more working hubs from a matrix suffering breakage, and the sinking of many working dies from these hubs, destroy Newman's paragraph beginning "This is conclusive evidence ..." Since Newman's entire technical case against these coins is to date based on the argument that only one working die was involved rather than several working dies from at least three of five working hubs, with this refutation his case collapses and the coins be presumed genuine.

Pages 10 and 11: As I stated earlier, late in 1964 I sent Newman, at his request, six lead trial pieces of the USAOG that I had obtained from Paul Franklin. He gives them his Nos. 20 through 25. His description of them in his report is cursory, and he hastily mentions the fact that five of them have unpublished obverse dies. Since new type obverses do not readily fit into his theory of copy dies fabricated via casting (which require a genuine prototype coin for the first step negative mould), he devotes a short paragraph (page 12) to this minor problem, solving it by suggesting that coins with new type designs or other components can be made via an involved six step process. Encouraged by the ease with which he disposed of the complexities of creating unknown coin types, Newman concluded that four of my six lead trials were struck using a reverse die that was indirectly made from a coin which bore a stage of the crack at right and which thus was (in his opinion) an example from a used production die. Here again we have the repeated Newman error that only one working die was involved in the manufacture of millions of coins. The premise of this basic error is such that he felt compelled to state: "This therefore is a strange set of trial pieces since the reverse die had already been used for production and the die had extensively cracked before the lead trials were made."

Some pages back I said that Newman Nos. 24, 25 (my

numbers TGT/P-110, 115) show two slightly differing states of an unpublished obverse intended for a fifty dollar piece. This obverse has the characteristics of the Franklin Hoard Twenty Dollar obverses, the dent on I of UNITED, and a trace of a rust mark (?) below the ribbon at left, but lacks the field scratch at last A in AMERICA. Instead of TWENTY there is a large 50, the 0 not double-punched and lacking the small die chip at its upper left. The first of these mentioned is struck upon a very broad flan (the size of a fifty dollar gold piece) with a reeded edge (148 reeds) and a border on both sides composed of large denticles. The reverse is otherwise blank except for two circular guide lines, the upper one of which has MOFFAT & CO (no period) struck in relief above it. The lettering is of identical style to that on an ex S. K. Nagy estate (non-Franklin) and doubtless authentic large lead ingot die trial (which see) reading AUGUSTUS HUMBERT ASSAYER around, ---Thou^{S} on scroll, MOFFAT & CO (no period) within, ---D ---C (spaces left for inserting value) below. The other mentioned, from a minutely different state of the identical obverse, is uniface. The maker of this obverse die clearly had access to a hub from which he made one die with TWENTY D., two with 50 D. and one with a blank space and D. (TG-113, which see). Since this same hub with the dent on I of UNITED and without the diagonal die scratch in the field just right of the second A in AMERICA is found on various dies of the regular 900 THOUS. issue (hub Group X), obviously

a link is established between the maker of the Franklin Hoard coins, of these lead pieces, and of regular gold USAOG twenty dollar coins. The amount of original equipment which must have been in the possession of this unknown alleged forger increases with every piece studied, and the end is not yet in sight.

The other three lead trial pieces with unpublished obverse dies, Newman Nos. 21-23 (my Nos. TGT/P-111, 112, 113), about which Newman complains on the premise that they were made from an old broken production die, mule two different reverse working dies of the hub Group VII type (denticle break at 3:30 o'clock) which lack the circumferential break at right with two obviously different obverses of round ingots intended for various denominations. These obverses are of the types hereinafter called F-2 and F-3, and impressions from these identical dies are known in California gold. (The two reverse working dies lacking the break at right are mentioned in the paragraph concerning reverse hub "D" but their characteristics are not listed in our tabular breakdown for hub Group VII, VIII, IX as that listing only includes examples in gold.)

Page 11: Before leaving the subject of the six lead trials from the Franklin Hoard, Newman referred to the reverse of four of them and made an interesting observation: "Comparing

this to another lead trial of a $20 USAOG reverse which has been in a museum for about fifty years it is noted that the latter does not have the dent in the frame line and does not have the die break found on the Humbert Associate Source lead trials." The piece that Newman mentions is Adams 84[2] which has long reposed in the Connecticut State Library in Hartford, as part of the Joseph C. Mitchelson collection. I told Newman about the existence of this lead trial when he first became involved with the Study Group. According to Mrs. Arline G. Maver, the curator of the Library collections, he visted Hartford in 1966. The reasons why the Mitchelson impression does not resemble any of the Franklin Hoard lead trials are many and varied, but one of them is quite fundamental - the Mitchelson lead 1853 USAOG twenty dollar reverse impression never was west of Pennsylvania; the Franklin Hoard lead trials were made in California.

In 1908 or early 1909, Joseph C. Mitchelson, of Tariffville, Conn., obtained a set of four lead die trials of the USAOG, each of which was crudely cut into an octagonal shape. Besides the twenty dollar reverse mentioned, an obverse and reverse for the 1853 ten dollars was included, as was an obverse trial for a USAOG five dollars. All were uniface trial impressions from single dies. Edgar H. Adams described the discovery of these rarities in the May, 1909 issue of "The Numismatist." Subsequently, he listed them as his Nos. 84, 85,

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2 pg. 105 "Pattern and Experimental Pieces of California, 1849-1853," Part IV of "Private Gold Coinage of California," Edgar H. Adams, Brooklyn, N.Y., 1913.

86, 87 and stated that "all (are) from dies which are now in the Philadelphia Mint cabinet."[3] Adams believed it probable that these dies (he said nothing about the impressions from them) were made in San Francisco and returned to Philadelphia. However, examination of the USAOG twenty dollar reverse impression refutes this innocent speculation. It is an impression from one of at least three matrices sunk from an original prototype in the Philadelphia Mint. All show parallel guide lines between the lines of lettering and a center dot, on the tablet. Before any of them was used to raise a hub, the shallow guide lines and center dots were removed by grinding or lapping, after which the recutting showing at left of 5 was likewise much weaker. When Newman looked at the Mitchelson lead piece he apparently did not notice that his "rice shaped raised lump under the right arm of the T of UNITED" was missing, and that he was looking at a matrix impression.

Adams illustrated the actual Mitchelson lead strike of the USAOG twenty dollar reverse in the May, 1909 issue of "The Numismatist." However, when his book was published in 1912-13, he illustrated No. 84 (in the "Pattern and Experimental Pieces" section) with a plaster cast taken from the USAOG twenty dollar reverse die in the Philadelphia Mint collection. In spite of the fact that the lead impression in Hartford has slowly deteriorated over the years, it is obvious that Adams made a serious mistake. The Mitchelson lead reverse trial and the

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3 ibid. Pages 105, 106.

positive he made from the die in "the Philadelphia Mint cabinet" are not the same. The die in Philadelphia fifty-five years ago was not used to strike the lead reverse in Hartford! A comparison of my greatly enlarged photo of the Mitchelson piece (USAOG-133) and the second plate of halftones in "Pattern and Experimental Pieces of California" quickly proves this point. The lead uniface trial, having lain face upwards for over half a century, has slowly corroded. The struck surface, because of numerous brushings to remove the lead carbonate deposit (which retards the rate of corrosive attack), has become rough and scaly looking. Even so, the guide lines and center dot are clearly visible, as are numerous defects both on various letters and the tablet frame lines. A glance at the Adams halftone shows none of these characteristics, but does reveal a remarkably clean and perfect looking USAOG reverse, befitting a plaster cast taken from a well preserved steel working die. The only defect even remotely discernible in the Adams illustration of № 84 is what appears to be a dent on the bottom tablet frame line under the F of CALIFORNIA. In addition, the die chip under the right arm of the T in UNITED is not visible. Finally, there is no sign of the die break at the right hand side of the tablet. What have we here? Could Adams have illustrated a working die compatible with the Franklin Hoard Group V gold coins?

Two matrices, apparently different than that used to strike the Mitchelson lead trial, are found together struck on a large (34mm) nickel alloy planchet with plain edge. This item first appeared in the Waldo C. Newcomer collection, his No. 2735; he paid $350. for it. Later, it was sold by B. M. Mehl to Wayte Raymond, and passed into the hands of F. C. C. Boyd, Abe Kosoff, Farouk, Hans Schulman, New Netherlands 1955, Louis Werner, G. S. Stephens, and Dr. Conway Bolt. It was purchased by me at the Bolt sale[4] (see USAOG-134). One of these two matrices (which one is hard to tell since both nickel impressions are weak and/or incomplete) is also known struck upon a very large (41mm) thick copper flan with plain edge. This matrix impression is in my collection (USAOG-125); it initially appeared in a S. K. Nagy consignment to the 1958 A.N.A. Convention sale. Both this copper trial and the "double reverse" Newcomer nickel trial show a light raised defect almost vertically between the F of OF and the first C of FRANCISCO (not visible on one side of the nickel piece) and a similar defect joining the bases of NI of CALIFORNIA. However, there are minor differences between the three impressions and I believe that the copper trial was made after the nickel one. One of the matrices was resurrected by some one either in the Mint or out of it, who altered it to read 1852, thus creating an unknown "pattern" reverse. This was accomplished by grinding down the

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[4] Lot 1192, Stack's Dr. Conway H. Bolt coll. auction sale, April 21-23, 1966.

matrix itself, removing most of the guide lines and imperfections, but leaving the center dot; the recutting at left of 5 remains as does a faint trace of the defect at F. C. The wrong size numeral 2 was used, that figure being heavily punched over the obliterated 3. Five impressions of this 1852 USAOG twenty dollar reverse are known, two in silver (Ford and Dr. Katz colls., ex Boyd and Raymond, Farouk); one in copper (USAOG-117); two in lead, in the Smithsonian (USAOG-108, 109). All can be traced to S. K. Nagy, the long time Philadelphia dealer who was intimate with Capt. John Hazeltine and William Idler, both of whom had access to Philadelphia Mint material.

As I have said, the 1853 USAOG twenty dollar reverse die (illustrated by Adams) was in the Philadelphia Mint cabinet collection as late as 1912. A notebook, prepared by Adams for Julius Guttag, and containing additions and corrections to "Private Gold Coinage of California," is in my library. In it, Adams states that the dies for his Nos. 84 through 87 are "now in the Government collection at Washington." The Smithsonian Institution did receive numismatic material from the Philadelphia Mint in the early 1920's (about the time Adams made up his Guttag notebook), but no record of these dies can presently be found at the National Museum. The twenty dollar reverse die with the characteristics of the Franklin Hoard Group V reverse may still be in the Mint, unless it was destroyed in 1938 along with other old dies. Its rediscovery would be extremely interesting.

At the beginning of this section I outlined in summary form the steps alleged by Newman to have been used to fabricate

the Garland (and related Franklin Hoard) coins. The second initial step described involved the use of ceramic or baked clay, the third step the use of centrifugally cast steel to make the actual dies from which the coins were first struck.

Both baked clay and cast steel lack the inherent qualities required for high quality transfer reproduction. Their basic composition prevents exact imitation of fine relief detail. The clay has a tendency to shrink when drying. Both have a tendency to shrink when cooling (the ceramic after baking, the steel after casting into the ceramic). This shrinkage is not always uniform and when quite fine detail is involved it is not difficult to find evidence of distortion. Paper currency manufacturers have long made geometric or engine turned patterns part of bank note designs. Many of these patterns are quite similar to that used upon the reverse of the 1853 USAOG twenty dollar coins. The purpose of these repeated ultra-fine designs on currency is to make their reproduction by counterfeiters difficult. Therefore, why would any forger select a coin to reproduce which had as part of its design these highly detailed patterns, and why would he select materials and methods totally unsuitable for the reproduction of even simpler designs?

Last September I wrote to the Bureau of the Mint[5] requesting information relative to the use of centrifugally cast

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5 Letter, John J. Ford, Jr. to Miss Eva Adams, Director of the Mint, September 30, 1966 (Appendix item No.23).

steel dies for the striking of coins. I enclosed a photographic enlargement of the reverse of one of the Franklin Hoard coins and copies of pages 11 and 12 of the Newman Inquiry, the latter containing Newman's explanation of how the coins under discussion were fabricated. I asked "if they have developed precision steel casting to the extent that coins of the quality shown on the enclosed photo (geometric design and all) can be struck from a die so made." Replying to that question and others, Miss Eva Adams, Director of the Mint, wrote me a detailed letter dated October 18, 1966.[6] Part of Miss Adams' reply is as follows: "Although we are continually examining questioned U. S. coins, many of which are determined to be counterfeit, this office has not had occasion to examine a counterfeit coin known to have been struck from dies produced by the described precision casting technique. However, our information, obtained from government experts who were instrumental in the development of the process, indicates that the following is true concerning the method, as it might be applied to the manufacture of coinage dies, either genuine or counterfeit:

(1) The fineness of detail attainable by present methods of hubbing will not be equaled in dies produced by the casting method;

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[6] Letter, Miss Eva Adams, Director of the Mint to John J. Ford, Jr., October 18, 1966 (Appendix item No. 24).

(2) Each cast die would necessarily go back to the engraver for hand or mechanical work which would result in variations between dies which would be apparent to an expert examining the resulting coins.

Both points made by the government technicians for Miss Adams should be self explanatory. The first makes it crystal clear that coins struck from hubbed dies (the process not having essentially changed since 1853) cannot be equaled in quality by coins struck from dies produced by any method of casting. The second point emphatically states that every cast die must be retouched or retooled, which would result in variations between them, or between the fruit of a retouched or altered cast die and a known genuine coin. The reasons why each cast die would go back to the engraver for hand or mechanical work should be evident to any one who has examined a cast coin,[7] and it should be strongly emphasized that steel does not have the flow, ductile or plastic qualities of the metals commonly used for casting coins.

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7 For an example of a cast coin (in a conventional metal commonly used for casting coins) see USAOG-115. This lead piece illustrates how the USAOG twenty dollar tablet reverse, with its twin panels showing engine turning, appears as a casting. The original of this ten-sided item appeared as lot 2018 in the 1958 A.N.A. Convention sale catalogue as part of a consignment by the late S. K. Nagy. The cast copy which I illustrate subsequently appeared in another public auction sale catalogue, where it sold for the remarkable price of $2,000. to a floor buyer.

Page 12: Newman takes note of the shrinkage problem when casting steel. "The shrinkage of steel in the casting produces a slight size differential which is unnoticeable unless measured by precision instrumentation." In her letter to me, Miss Adams also quotes this statement, and in doing so says that "one major reason for the coins' being distinguishable is frankly stated in the report."

Four or five years ago, I was concerned with the authentication of another Pioneer gold coin. At that time I was accused of selling a Norris, Grieg & Norris five dollars as genuine, after a well known dealer had condemned it as being a cast piece. In endeavoring to prove the coin a struck example, I sent it to Dr. Vladimir Clain-Stefanelli, curator of numismatics at the Smithsonian Institution. Dr. Stefanelli in turn sent the coin together with a specimen from the National Museum to the Federal Bureau of Investigation Laboratories. The FBI people individually photographed both coins to an identical degree of considerable enlargement on 8x10" sheets of black & white positive film. Care was taken to see that the coins were photographed within minutes of each other, with the camera, coins and lights in the same position for each photograph. Both sheets of film came from the same box, both were developed at the same time in the same tank of developer; equal care was taken that both sheets of film received identical treatment during the remaining steps of the

processing. The finished positive photographs (or transparencies) were then superimposed and examined with the aid of a back-lighted ground glass viewer. I was told that the cast coin would be smaller in diameter than the struck one, the shrinkage being most perceptible about the periphery of the smaller specimen. Happily, no evidence of shrinkage was discernible, and subsequent X-ray fluorescence tests confirmed my original judgment. With this experience in mind, I had similar enlarged transparencies made of two Franklin Hoard coins and two regular USAOG pieces. USAOG-103 (Group IX-1, Franklin) and USAOG-126 (Group X-2, non-Franklin) were photographed on black & white positive film by Laurence Steur of the Medical Illustration Laboratory of the New York Veterans Administration Hospital (Exhibit Transparencies C-4a C-4b). Steur also photographed USAOG-124 (Group V-1, Franklin) and USAOG-130 (Group X-3, non-Franklin) on Ektachrome positive color film (Exhibit Transparencies C-5a, C-5b). Superimposition of these transparencies was quite revealing, as much information was gained concerning the possible methods of matrix composition, the make-up of dies from hubs, the relative depth of sunk dies, and even the alignment of dies in a press and collar fabrication. Last but not least, neither of the Franklin Hoard coins (in comparison with the control specimens) showed the slightest evidence of shrinkage. This is particularly significant in the light of the Newman allegations concerning how these coins were made. Clearly, the Newman

process would involve not just nominal shrinkage (as would occur in the case of casting a coin in a metal commonly used for that purpose), but dual shrinkage of considerable total magnitude. His ceramic hubs would certainly shrink when dried and/or baked, and there could be a slight size discrepancy from the thickness of the separating medium. In addition to this shrinkage, there would be definite, measurable shrinkage of the cooling molten steel (as mentioned by Newman, and confirmed by Miss Adams). Since the Franklin Hoard coins display no signs of any shrinkage, the conclusion can only be that these pieces were struck from non-cast dies, and thus be presumed genuine.

Earlier I mentioned the Newman idea of how new type coin designs or other components could be fabricated. This was in connection with the unpublished obverse dies on five of the six lead trial pieces that I sent to St. Louis for examination nearly three years ago. There are numerous flaws in the six step process described by Newman on page 12-coin to wax (latex or plastic), wax (or whatever) to ceramic, ceramic to steel die, steel die to steel hub, steel hub to steel die, steel die to coin, even if one discounts the proven fallacies of his cast die theory. For instance, his concept of punching different letters or different numerals into a die, the working part of which is five steps removed from the prototype, would require sets of letter or

numeral punches that would be compatible with the style and appearance of the letters and/or numerals already in the die. These are not available on the market, since the style of letters andnumerals has changed during the last century, and even if they were, the correct size would be difficult to duplicate. Obviously, such punches would have to be made, another tedious and expensive, if not impossible, proposition under the circumstances. There are other faults in Newman's six step process, but it is unnecessary to pursue them, since the entire modus operandi is predicated upon his discredited cast die argument.

THE FRANKLIN HOARD COINS - WHYS AND WHEREFORES

Let us review, briefly, the events which led to the issuance of over two-and-one-half million twenty dollar gold coins, of the fineness of 900 parts gold per thousand, by the United States Assay Office of Gold in 1853.

Augustus Humbert first started operations as "United States Assayer" in San Francisco on the last day of January, 1851. This was almost four months to the day from the date of the Act of Congress that authorized his title and put him in business. He was in California to convert raw gold into a commodity that would bear the Federal government stamp (testifying to its standardized weight and fineness), have a fixed and accepted value, and which could and would be used as a medium of exchange. He was in California as "United States Assayer" to force the State Assay Office out of the "officially stamped" ingot or what amounted to the "money making" business. He was authorized to associate himself with an established and reputable private coiner and he chose Moffat & Co.

From the beginning, Humbert conducted a semi-official operation. He was operating what amounted to a provisional branch mint, on a highly irregular basis, under